

Middle Silurian group; and on the fossil evidence in the Cambridge Museum Professor M'Coy ventured to affirm his conviction, that some great sectional or palæontological error had been committed in the establishment of the middle group.

We put this conclusion to the test in 1852; and on good sectional and fossil evidence, we were enabled to break up this group into two parts, which were not only palæontologically distinct, but generally unconformable one to the other. Thus the May Hill Sandstone became at length the true base (physically and palæontologically) of the whole Silurian series; and by the interpolation of that sandstone there will be no longer any real difficulty in the tabular view which will precede the Third Fasciculus*.

I might here (as not by any means unconnected with the subject of this communication) also dwell upon the great value of Professor M'Coy's determination of the Devonian corals, as distinguished from the Cambrian, the Silurian, and the Carboniferous: but I must forbear; and I hope to take up some of the subjects, here pointed at, in a future communication.

XXVII.—*Notice of the discovery of Desmarestia Dresnaji on the coast of Ireland.* By R. K. GREVILLE, LL.D. &c.†

[With a Plate.]

THE Alga to which this notice refers was collected towards the close of last year, at Moville, near the mouth of Lough Fyle in the north of Ireland, by William Sawers and — Morrison, Esqrs., and communicated by the former gentleman to Professor Balfour, by whom specimens were placed in my hands for examination. It is a form quite new to the British flora; and as its affinity is involved in some obscurity, its discovery on our shores is invested with considerable interest. Specimens transmitted to the celebrated French cryptogamist, Dr. Montagne, have been pronounced by him to be identical with an Alga found by himself at Fort St. Sebastian in 1823, and published in the 'Annales des Sciences Naturelles' for 1842, p. 251. t. 7. f. 2, under the name of *Desmarestia pinnatinervia*. Dr. Montagne obtained only a single individual, scarcely more than 4 inches high, fully 2 inches wide, and truncate; being evidently an abnormal development. M. Cronan has likewise met with it, though rarely, at Brest, and regards it as a variety of *Desmarestia Dresnaji* of Lamouroux,

* Memoir read before the Geological Society of London, Nov. 3, 1852.

† Read before the Botanical Society of Edinburgh, January 12, 1854.

described and figured in the 'Dictionnaire des Sciences Naturelles,' t. xiii. p. 105, the figure being half the natural size. Professor J. Agardh—the most recent authority—in his great work, 'Species, Genera et Ordines Algarum,' refers both the above Algæ to varieties of *Desmarestia ligulata*, but still includes *D. pinnatinervia* among his "Species inquirendæ," with the additional remark, "videtur pars inferior frondis latioris Desmarestiæ ligulatæ."

D. Dresnayi, Lam., which was published in 1819, was found on the French coast. It has a slender stipes about half an inch high, which immediately gives off two lateral fronds about 2 feet long and 1 to 2 inches broad, linear-lanceolate, with a fine longitudinal nerve and very delicate opposite lateral nerves, which are sometimes forked. The margin is sinuate, more or less toothed, and towards the base some of the lateral nerves are prolonged into very short leaves of the same form as the frond, thus manifesting a tendency to the pinnate development characteristic of the genus. The colour is described as olivaceous, and the substance membranaceous.

D. pinnatinervia, judging from the figure given by Dr. Montagne, has so close a resemblance to *D. Dresnayi*, that were the two side branches in the figure of the latter plant removed, the remaining central portion (which appears to have been shortened by some injury) would be almost a fac-simile of it. The character of the nervation and of the margin is precisely the same in both—so also is the stipes, the colour and the substance. The frond, however, is quite simple, and Dr. Montagne compares it to large specimens of *Laminaria debilis*.

With regard now to the Irish plants, they appear to constitute an intermediate link between the two forms above mentioned. They have a slender well-defined stipes half an inch long or more, a linear-lanceolate frond from 12 to 18 inches long and 2 to 4 inches broad, the margin more or less sinuate and dentate. An exceedingly fine but very perceptible nerve runs from the base to the apex, from which, lateral ones opposite, and frequently forked, are given off at intervals of nearly a quarter of an inch. These lateral veins, which are somewhat inconspicuous, at least in the dried specimens, terminate in the marginal denticulations. Mr. Sawers observes, that the colour in the fresh state is that of a *Laminaria*, while the substance is thinner. That gentleman also describes the margin in one or two specimens as slightly proliferous; bringing the plant so very near to *D. Dresnayi*, that I do not see how the two can be separated; and the latter name having the priority must be retained, if they are to be considered as distinct from *D. ligulata*.

It must be confessed that the transition from the ordinary

narrow and decomposed state of *D. ligulata*, as it occurs on the British coast, to that of the Alga under consideration, is very remarkable; and as far as I know, intermediate states have not occurred. But Professor J. Agardh speaks of the frond of some French specimens of *D. ligulata* as an inch in breadth. Professor J. Agardh's var. β . (*D. herbacea*, Lamx.) and var. γ . (*Sporochneis herbaceus*, var. *firma*, Ag. Syst.) do not at all agree in their pinnated forms and spinuloso-serrate margin with our plant; and if his conjecture should eventually prove to be correct, it would be difficult to adduce a more extraordinary deviation from a specific type. It might be described as var. δ . *subsimplex*. In the mean time a figure (Pl. XIV. fig. 1) of so interesting an Alga will, it is hoped, be not unacceptable to the British botanist.

XXVIII.—*On the Mechanism of Aquatic Respiration and on the Structure of the Organs of Breathing in Invertebrate Animals.*
By THOMAS WILLIAMS, M.D. Lond., Licentiate of the Royal College of Physicians, formerly Demonstrator on Structural Anatomy at Guy's Hospital, and now of Swansea.

[With two Plates.]

[Continued from p. 200.]

THE epidermal skeleton of the Arthropoda is histologically peculiar. *Chitine* was first defined by Odier*. In the year 1845 it was more fully investigated by C. Schmidt†. By Lassaigue it has been distinguished under the name of *Endomadern*: it is a proximate principle which resembles *cellulose*. Both are insoluble in caustic potass. Nitrogen however is present in chitine and absent in cellulose: it is the animal basis of the integumentary structures of Insects and Crustacea. It is a principle of low vital properties. To the presence of this substance is probably to be ascribed the fact, already mentioned as extraordinary, of the universal absence of vibratile cilia from *all* the structures of Insects and Crustacea. And why is *vibratility* not a property of those organized parts of which *chitine* is the proximate basis? The very definedness of this question marks an advance in the *real science* of physiology. Effect is linked to its true cause, attribute to its right substratum, function to its immediate instrument. Chitine is produced under two distinct conditions: in Insects it occurs under the circumstances of atmospheric respiration, in Crustacea under those of the aquatic.

* Mém. de la Soc. d'Hist. Nat. de Paris, 1823, p. 29.

† Zur Vergleich. Physiol. d. Wirbellos. Thiere, p. 32.